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The Design for Business Initiative: A Systematic Approach to Embedding Entrepreneurship in Design Education

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Abstract: The paradigms of entrepreneurship education are manifold, however, it is doubtful that successful entrepreneurs attribute their skills to academic programmes. Yet, within HEI's there is a need to support and encourage entrepreneurial behaviours and create immersive learning opportunities that allow students to develop and grow their skills in real-world scenarios. Design education plays an important role in driving innovation through the creation of new products and services. However, due to an increasingly overcrowded curriculum, it has become more and more difficult for design schools to create an interconnected learning environment that recognises the role and value of embedding entrepreneurial skills, qualities and attributes. This study explores the strategic initiative, "Design for Business", a partnership between Duncan of Jordanstone College of Art & Design (DJCAD) and the Centre for Entrepreneurship (CfE) at the University of Dundee (UoD), which strives to embed entrepreneurship content in design curricula across all levels. Through an in-depth review and analysis of published materials, including testimonials, competition results and venture creation activities, the study sets out to discuss the infrastructure, challenges, success rates and how the initiative was received by participants. Results show that the initiative reaches far beyond a theoretical approach and equips students with entrepreneurial skills while assisting with start-up and spinout advice. In addition, evidence suggests that the initiative builds on the innovator-entrepreneur relationship, synergistically creating holistic learning experiences that seamlessly interconnect curricular and extra-curricular opportunities to cultivate entrepreneurial activity tailored to different levels of ambition and motivation. The paper concludes with a set of recommendations for further developing the initiative, paying particular attention to the further integration of entrepreneurial opportunities, top management support and increasing awareness and understanding among staff.

Keywords: Entrepreneurship Education; Design; Curriculum Design; Systems of Learning, Integration.

1. Introduction

Covid-19 has ushered in a new era for businesses and entrepreneurs, significantly impacting growth in some sectors and creating previously unimaginable opportunities in others. Quick adaptation and pivoting considering changed market conditions have separated the wheat from the chaff across global economies. Within the education sector this means that "it is therefore key for institutions not just to cater to the need to keep existent businesses alive. They must also continue to nurture a fertile ground for entrepreneurship and stay connected with other economies, to remain alert to new opportunities, and safeguard the jobs of the future" (Bosma et al. 2020, p.1).

Lack of education is still one of the major barriers to entrepreneurship. In Higher Educational Institutions (HEIs), if students do not attend a purposefully designed business or entrepreneurship course, they will generally be guided and prepared to be suitable future employees for existing organisations in their field rather than self-determined entrepreneurs (Rideout and Gray 2013). Furthermore, it is common for HEIs to separate the disciplines by creating schools or departments which tend to operate independently from one another thus contributing to silo mentality, which can hinder progress for individual disciplines when "the importance of interdisciplinary entrepreneurship education as an inherent feature of itself" is not acknowledged (Winkler et al. 2021). In recent decades, however, interdisciplinary activity amongst academic scholars has created a subtle shift towards the convergence of subjects that is slowly highlighting the need for more interconnectivity in the curriculum in order to enable students to deal with the increasingly complex issues of our time (Newell 2007).

The discipline of design, with problem-solving at its core, has always been inherently interdisciplinary in nature and is usually taught in the context of other subjects to enable pertinent design solutions (Davis 1999) relevant to all industries and all aspects of life. Likewise, entrepreneurship education is not very effective when restricted to the umbrella of business studies only, as it "spans disciplinary boundaries and levels (...) [and] should [therefore] be explored as a part of every educational system, locally and globally, at the micro and macro levels, in every field" (Liguori et al. 2018, p. 6). It is this fluidity of scholarly boundaries within both disciplines that

presents an opportunity for interconnectedness in the curriculum fostering innovation-driven entrepreneurial behaviours.

The “Design for Business” (DfB) initiative was created to harness this very potential by systematically interweaving teaching activities of both fields to create an integrated learning experience for students of all levels at Duncan of Jordanstone College of Art & Design (DJCAD) at the University of Dundee (UoD). Its purpose is to encourage entrepreneurial behaviour, enable students to develop market-ready solutions and make venturing a viable alternative career path for graduates. DJCAD always seeks to support experiential learning opportunities for students through internal and external collaborations and partnerships. Dundee is a creative and cultural city and in 2015 it became the first and only UK City to be awarded with the UNESCO City of Design status. In partnership with the V&A Museum at Dundee, an international centre of design for Scotland, DJCAD has a particularly important role to play in unlocking innovation potential. The University of Dundee (UoD) has a long-term strategy of being one of the most entrepreneurial universities in the UK both in terms of developing an entrepreneurial mindset and culture across the institution. The university has therefore created the Centre for Entrepreneurship (CfE) to “...firstly improve the self-reliance and employability of the University's students, staff and recent graduates by developing their enterprise skills. And secondly, to support those who wish to embark on the journey of starting their own business” (Centre for Entrepreneurship 2021). The embedding of entrepreneurship content at DJCAD has therefore recently been strengthened through the creation of the CfE. Within DJCAD, there were already established areas of best practice in the delivery of entrepreneurial education across the spectrum of design subjects, like product, interaction, illustration, graphic, animation, jewellery, interior and textile design. However, due to an increasingly overcrowded curriculum, it had become apparent that an interconnected learning environment that recognises the role and value of embedding entrepreneurial skills, qualities and attributes needed to be cultivated.

This study was undertaken to explore the levels of collaboration and integration of entrepreneurial content in design curricula at DJCAD, as well as the challenges and outcomes for students and staff resulting from the implementation of the DfB initiative.

2. Data Gathering

Data gathering and analysis for this case study is based on the following:

- Review of module descriptors and delivery schedules (module content) of key modules and programmes at DJCAD.
- Review of entrepreneurship offerings by the CfE, including, for example, competitions, master classes, training and support programmes.
- Review of historic and current competition results and data from 2017 until 2021 on student engagement with those offerings as an indicator for success of the initiative.
- Evaluation of key staff and student experiences on the integration of CfE offerings at DJCAD. Data was gathered through interviews and surveys.

The infrastructure is explained below and visually condensed in Figure 1 (Section 3.3) showcasing the interconnectivity of entrepreneurship and design education offerings within the initiative.

3. The “Design for Business” Infrastructure

3.1 Centre for Entrepreneurship (CfE)

Sitting within the Student Services Directorate, the Centre’s initiatives, such as masterclass lectures, enterprising skills programmes, an annual entrepreneurship week and a university wide business idea pitching competition, provide a clear pathway for those who are wishing to learn highly transferrable enterprising skills to those who are wishing to embark on the entrepreneurial journey of venture creation. Entrepreneurship is increasingly being promoted as a viable career pathway for students (Nabi et al. 2018), and in order to further encourage and support early-stage entrepreneurs within the Dundee City region, the UoD entered a partnership in 2017 with Elevator (a Scottish-wide social enterprise business support service) to open a £250,000 public access facility on campus. The joint partnership delivered the first on-campus business Accelerator programme at any Scottish University, running three times a year with a specific annual summer intake reserved for staff and students across the region. The partnership aims to support Dundee City’s entrepreneurial culture to have further positive impact on the area’s economy.

3.2 Duncan of Jordanstone College of Art & Design (DJCAD)

At DJCAD, students are encouraged to take risks, pitch ideas and value the fundamental aspect of business skills that bring their ideas to life in the marketplace. The prevailing studio culture also places an emphasis on peer learning and provides a professional learning environment to nurture students' creative practice. There has been a history of embedding entrepreneurial teaching in the curriculum through live projects and competitions, specific taught content and the delivery of interdisciplinary modules. Indeed, within the majority of design subjects there have been repeated efforts to implement specific Intended Learning Outcomes (ILOs) associated to professional and transferable skills. However, there was an opportunity to embrace the generic offers provided by the CfE to enhance the delivery of entrepreneurship teaching and learning within the school in a more coordinated and interconnected way to help both staff and students to excel in their practice whilst also providing new career progression pathways beyond the traditional disciplines. Yet, a major difficulty was in connecting and integrating the entrepreneurial offerings delivered by the centre with the existing operational structures and practices of the school. Therefore, a successive, staged learning environment was created that enabled the school to be both flexible and rigid ("flexigid") (O'Malley 2010) in achieving its learning outcomes and at the same time supported design-driven entrepreneurial innovation.

3.3 Design for Business (DfB) Initiative

The DfB Initiative is an integrated system of learning that delivers entrepreneurial education across design subjects at DJCAD (Figure 1). The figure is further explained in the Findings (Section 4).

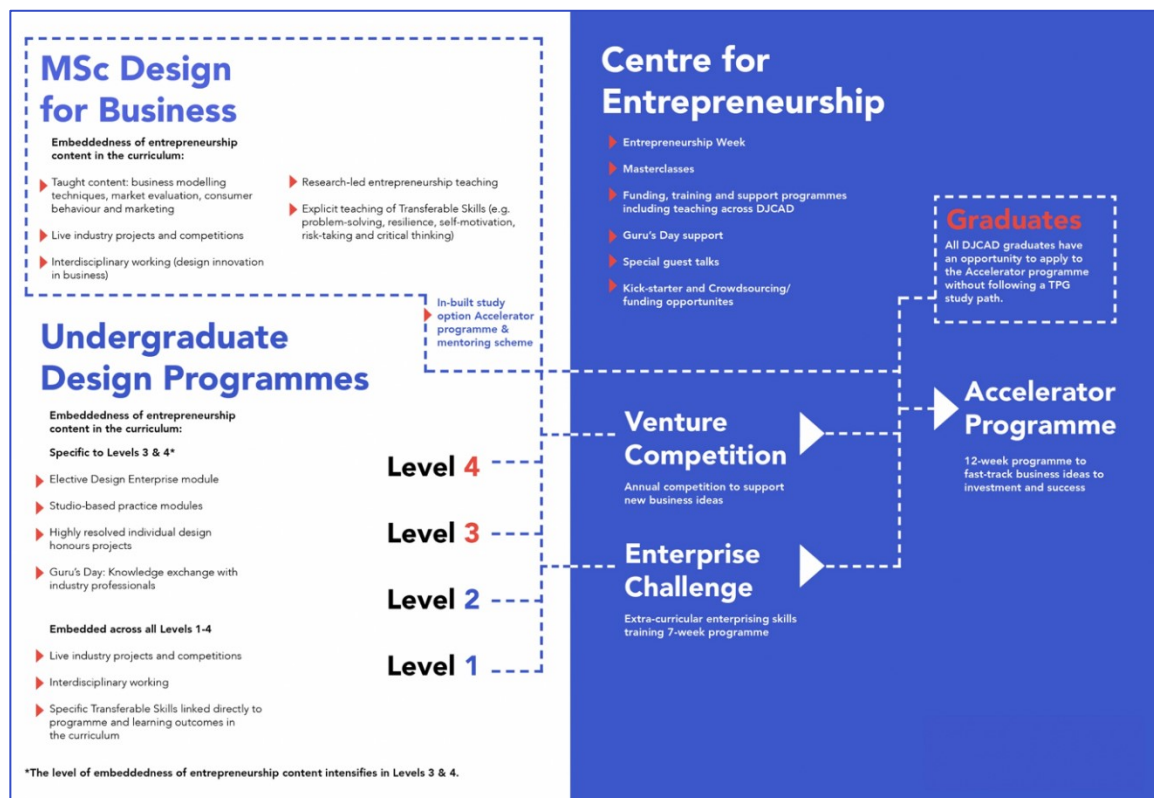


Figure 1: Overview of the DfB Initiative

Some of the more significant features of the initiative, i.e., the Design Enterprise module, the MSc Design for Business programme and the tailored offerings provided by the CfE are discussed below in more detail showcasing the interconnected nature of the initiative.

3.3.1 The Design Enterprise Module

The aim of the Design Enterprise module is to provide students with an opportunity to understand how businesses and markets operate and to allow them to develop an in-depth business plan based on an innovation in the context of their studio-based module or their discipline. Within the module students are required to submit a business plan that explores the marketplace, Unique Selling Points & value propositions, funding routes and successful marketing strategies. At the core of the DfB Initiative, this module presents an opportunity to

deliver a closely-knit, collaborative approach with the CfE. More specifically, the CfE delivers a number of entrepreneurship focused sessions as part of the indicative content of the module, for example, start-up do's and don'ts, case studies on entrepreneurial journeys and finance. Knowledge exchange is offered through guest talks and master classes with internal and external entrepreneurs. This module is a prime example of the interconnected approach of the DfB Initiative which acts as a direct feeder to the MSc Design for Business programme at DJCAD (discussed below).

3.3.2 About the Enterprise Challenge

The CfE delivers the bi-annual Enterprise Challenge as an extra-curricular enterprising skills training 7-week programme. The workshop content consists of ideation, business modelling, market research, competitor analysis, marketing, IP, finance and culminates with a submission of a business proposal and a live pitch at the final event. The delivery is undertaken by both university staff and external industry experts. The programme is open to all staff, students and recent graduates at UoD, as well as students from other HE/FE institutions in the region. There are two prize categories:

1. The Most Enterprising Team Award – for teams who do not wish to take their business idea forward at this stage but have delivered a compelling business case that deserves recognition. Winners receive advanced personality profiles by a dedicated sponsor.
2. The New Business Idea Award – for teams who wish to take their business idea forward and have demonstrated they have the most viable business opportunity. Winners receive prize funding for their business idea and a guaranteed place on the Accelerator programme.

3.3.3 About the Venture Competition

The CfE delivers an annual Venture Competition with significant prize funding to support new business ideas. The competition is open across the institution to staff, students and recent graduates. The rationale for the competition is to draw out potential business ideas at the university and help translate them into a validated business opportunity. Finalists pitch at the Venture Final during the university's Entrepreneurship Week to a panel of judges and a public audience including investors and members of the business community across Scotland. All applicants receive constructive feedback on their business ideas.

3.3.4 About the Academic Accelerator Programme

In a unique partnership with Elevator, a social enterprise focussed on supporting new entrepreneurs throughout Scotland, the CfE is one of the few academic institutions in Scotland with a bespoke business Accelerator programme hosted on campus. The Accelerator (2-3months long) is designed to fast-track business ideas to investment and success by providing a desk space alongside fellow entrepreneurs, a bespoke curriculum, and access to expert advice and contacts they will need to take their business to the next level—all free of charge. The Academic Accelerator programme delivers a tailored offering to students and staff during the summer months. This is where DJCAD students, who have developed their business ideas throughout their studies and offerings by the CfE, receive in-depth expert support to implement their business.

3.3.5 MSc Design for Business Programme

The TPG programme builds on the interdisciplinary nature of the design subjects, the studio-based modules and the Design Enterprise modules delivered in Levels 3 and 4 across the school. The MSc programme provides students with the theory and skills to be effective designers, managers and leaders of the future within an organisational context as well as the entrepreneurial skills to develop their own business. Students learn to capitalise on models of innovation, service design frameworks, Design Thinking in business, marketing, leadership, culture and entrepreneurship. The modules are supported through direct involvement of CfE staff and external partners who contribute to the delivery of taught content. As a result, this creates more student engagement with the extra-curricular offerings, such as Enterprise Challenge, Venture Competition and master classes. More significantly, the programme encourages participation with the Accelerator programme as an in-built study option along with a mentoring system tailored to students' specific venture creation. The objectives of the DfB Initiative underpin the rationale and the philosophy of the MSc Design for Business programme (hence the same name) and is also the main driver for student engagement with the CfE at TPG level.

4. Findings

The findings presented are a summary of the analysis from the data gathering and refer to Figure 1.

4.1 Review of module descriptors and delivery schedules (module content) of key modules and programmes at DJCAD

Level 1 and 2 curriculum content focuses primarily on the practice of design in the context of subject disciplines. Transferable skills are embedded in the module ILOs laying the foundation for entrepreneurship content at higher levels. The level of engagement and depth of entrepreneurship teaching intensifies across Levels 3 and 4 and then again at Level 5 within the MSc Design for Business programme in the form of specifically tailored modules covering indicative content on business and entrepreneurship. For instance, in Levels 3 and 4, “Design Enterprise” is a two-part elective module that is delivered across all design subjects that allows students to explore their creative outputs in an entrepreneurial context. The module sits alongside a studio-based module in which students are required to enhance their design practice by creating new products and services. In addition, the MSc Design for Business programme provides graduates with a further opportunity to grow and develop their innovation-driven entrepreneurial behaviours and launch successful new businesses. The CfE offers an array of entrepreneurship competitions, start-up support as well as curricular support within the design school.

4.2 Review of entrepreneurship offerings by the CfE, including, for example, competitions, master classes, training and support programmes

The CfE reaches far beyond a theoretical approach to equip staff, students and graduates with entrepreneurial skills and assisting with start-up and spin-out advice by offering live projects, competitions, interdisciplinary working, master classes, funding advice, training and support programmes delivered by internal and external entrepreneurial practitioners. This is achieved through competitions, masterclasses, funding advice, training and support programmes delivered by internal and external entrepreneurial practitioners. In addition, a tiered approach offering these opportunities alongside tailored support mechanisms has enabled synergies of success and yielded significant results. For instance, since 2017, DJCAD students have continuously exceeded expectations and outperformed other schools at the University by consistently demonstrating the highest engagement and success rates in competitions and have been prolific in the pursuit of entrepreneurial endeavours.

4.3 Review of historic and current competition results and data from 2017 until 2021 on student engagement with those offerings as an indicator for success of the initiative

Enterprise Challenge

DJCAD students have performed consistently well during this programme either in developing their own business idea, which is sometimes related to their own studio-based honours project or as part of a multi-disciplinary team. Although the level of engagement appears to be low (15% in 2020/2021), it should be acknowledged that participation numbers consist of students from across 10 schools and DJCAD students have a successful track record of winning (Table 1).

Table 1: Annual Breakdown of Enterprise Challenge

2020/2021	9 out of 123 participants were DJCAD students (15%) Most Enterprising Team Award – winning team included 1 DJCAD student Most Enterprising Team Award – winning team included 2 DJCAD students
2019/2020	25 out of 104 participants were DJCAD students (24%) New Idea Award – winning team included 1 DJCAD student New Idea Award Runner-up – winning team included 1 DJCAD student (who later received a place on Accelerator Programme)
2018/2019	22 out of 121 participants were DJCAD students (18%) New Idea Award – winning team included 1 DJCAD student Most Enterprising Team Award – winning team included 1 DJCAD student Most Enterprising Team Award – winning team included 2 DJCAD students

Venture Competition

The data below indicates that DJCAD has a higher engagement rate compared to other schools, with an average of 9 DJCAD entries compared to an average of 4 entries from 9 other schools. DJCAD entries (including staff as well as students and recent graduates) have a more than 5 times higher success rate than other schools, winning £55,500 out of a total prize fund of £144,500 (Table 2).

Table 2: Annual Breakdown of Venture Competition

2021	7 out of 43 applicants were DJCAD entries (16%); Won £5,000 from £38,000 prize fund
2020	17 out of 64 applications were DJCAD entries (27%); Won £13,500 out of £28,000 prize fund
2019	7 out of 48 applications were DJCAD entries (25%); Won £12,500 out of £27,500 prize fund
2018	7 out of 50 applications were DJCAD entries (26%); Won £10,000 out of £26,000 prize fund
2017	7 out of 39 applicants were DJCAD entries (28%); Won £14,500 out of the £25,000 fund

The winners and shortlisted candidates of the Venture Competition are offered a place on the highly esteemed Accelerator programme (as discussed in section 3.3.4). Using the prize funding, they continue to develop a detailed business plan to start trading after completion.

Accelerator Academic Summer Programme

Through the DfB Initiative, we have seen a year-on-year increase in participants commitment to the implementation of their new venture creation by joining the Academic Accelerator programme (Table 3).

Table 3: Annual Breakdown of New Venture Creation through the Accelerator Academic Summer Programme

2020	4 out of 14 business founders were DJCAD (29%); lower numbers due to the impact of Covid-19
2019	5 out of 10 business founders DJCAD (50%)
2018	3 out of 16 business founders DJCAD (19%)
2017	1 out of 15 business founders DJCAD (7%)

The results above show significant positive developments for DJCAD students over the last years since the initiative was launched. They have been engaged and successful across the board of most extra-curricular CfE offerings.

4.4 Evaluation of key staff and student experiences on the integration of CfE offerings at DJCAD, data was gathered through interviews and surveys

Through analysing student feedback, staff reflections and more importantly, the evaluation of students' success stories and their business creations, the initiative has been highly effective in delivering an experiential learning journey that leads to increased engagement with the CfE thus leading to higher entrepreneurial success rates. What now follows are several extracts from participants who commented on their learning experience.

Participant and Staff Reflections

Commenting on the Enterprise Challenge, one participant highlighted how the initiative has helped build confidence in order to make the transition to business implementation, saying:

"Having previously studied Product Design, I entered the competition with a strong understanding of visual communication techniques and developing products but had limited knowledge of how a business

functions. Through the weekly sessions on different themes (incorporation, finances, insurance, legal), I gained a new awareness of entrepreneurial skills and how they can pair up seamlessly with design techniques. Alongside the Enterprise Challenge, I continued to complete the MSc Design for Business programme at the University of Dundee. I found that the extra-curricular activities provided by the CfE influenced my approach to my MSc projects as well.” (Alice Harper, 2021)

Another participant acknowledged the importance of the Venture Competition as a route to an entrepreneurial career after graduation, commenting:

“The Venture Competition allowed me to explore new business opportunities and further my design skills with an entrepreneurial mindset. Throughout the process, I used a Design Thinking methodology to design my own business. The CfE and lecturers were on hand to help with problems or queries as I encountered them. The business acumen I gained from the competition has increased my skills and given me quantifiable business development experience helping me transition from my studies to starting up my own business. (Aaron Donald, 2021)

This participant was actively involved in all parts of the DfB Initiative, from undergraduate design studies to TPG. He was a winner of the Venture Competition and successfully launched his business after completing the MSc Design for Business and the Accelerator programme:

“The relationship between the MSc Design for Business programme and the CfE has given me a unique opportunity to explore entrepreneurship as a future career pathway. The MSc curriculum provided me with a theoretical and practical understanding of Entrepreneurship and the courses and competitions delivered by the CfE allowed me to put what I had learned into practice in a real world setting with my own business idea. The integration of these two areas of the University were invaluable to me.” (Robbie Beautyman, 2019)

Elevator staff acknowledged an increased level of engagement by DJCAD students with the Accelerator programme:

“Elevator has had a very strong engagement with DJCAD students and graduates since the Dundee Flagship Accelerator kicked off in September 2017. Because most - especially those who have participated in our summer Academic Accelerators – have had time to develop their ideas on their course and in many cases, have worked with the Centre for Entrepreneurship team, they have a clearer idea of the features and benefits that their concepts will offer. They are also more familiar with many of the techniques that we use on the programme, such as Design Thinking for business, the business model canvas and value proposition.” (Cat Ward, 2021)

Interestingly, staff have also emphasised the prevailing discrepancies between design creation and practice and market-readiness:

“It can be difficult when students / graduates have spent time during their studies working on a product to find out that the market doesn’t want or need it. This can be a challenge, so we encourage founders in this situation to “fail fast” and pivot.” (Cat Ward, 2021)

By the very nature of the design disciplines, students undoubtedly excel in their practice, but it is the opportunity to apply and contextualise their design ideas in a business and marketing context that creates valuable synergies that enhance student motivation and entrepreneurial behaviours.

5. Discussion

This case study set out to examine the levels of integration of entrepreneurial content in the design curriculum at DJCAD and outcomes for students and staff resulting from the implementation of the DfB initiative. In addition to the findings and discussion above, the analysis of the data has identified further challenges that were overcome through the initiative.

It is clear that the working relationship between DJCAD and CfE has performed well and is intuitively complementary. It was found that the embedment of a “flexigid system of learning” provided holistic and engaging pathways in the delivery of entrepreneurial education at DJCAD. It supported existing best practice

and fostered a better understanding of innovation-driven entrepreneurial behaviours in students and staff alike. A more dynamic and interconnected curriculum was created, which offered impactful curricular and extra-curricular entrepreneurial learning opportunities. Students gained confidence and entrepreneurial skills as key elements of transferable skills development (i.e., problem-solving, resilience, self-motivation, risk-taking and critical thinking) and were able to create successful market-ready design solutions.

Before implementation of the initiative, students generally received interest towards the end of Level 4 studio-based modules from potential customers, or coverage from the national press, amplified by the annual degree show. This sparked their interest in an entrepreneurial pathway at a very late stage in their studies. During that time, the CfE aimed to engage with as many students as possible, while supporting 9 other schools, but having only a small team of 3-4 full-time staff made it a challenge for the centre to meet this “seasonal” demand. However, the DfB Initiative has now created a more interconnected curriculum across all study levels and therefore promoted an earlier appreciation of entrepreneurial pathways after graduation to students and staff. Another challenge identified in relation to an entrepreneurial career pathway was students’ lack of confidence in their ability to become entrepreneurs or to proceed with a new venture creation. The DfB Initiative has helped to build confidence in the student journey by encouraging risk taking and breaking down barriers through the early introduction of entrepreneurial content and activities. The repeated, meaningful engagement with offerings from the CfE helps students embrace an entrepreneurial mindset throughout their design studies and opens their eyes to speakers and case studies that demonstrate teams and individuals who began at a similar embryonic stage.

The curricular and extra-curricular entrepreneurial activities have created fruitful synergies within the overall learning experience and have helped to overcome challenges associated with an over-crowded taught curriculum. Within DJCAD there was a legacy of excelling at the practice of designing and where the object prevails rather than seeing the value of a curriculum that also integrates theoretical and business-oriented teaching. Giving up space in an already crowded curriculum that focuses on the activity of “thinking through making” was a particular challenge. The DfB initiative has fostered student engagement with entrepreneurial activities at undergraduate level and therefore laid the foundation for an increased student interest in pursuing the MSc Design for Business programme, for example, thus deviating from traditional study pathways. The programme is an example of best practice with regard to the integration of traditional teaching objectives with Transferable Skills and market-oriented innovation, supporting students in becoming design-driven entrepreneurs. Interestingly, a deliberate consequence of this initiative was the natural convergence of like-minded students to later enrol onto the MSc Design for Business programme.

6. Recommendations

Future development plans to enhance the initiative should include:

- Providing dedicated CfE staff to support and amplify the results and outputs that have been observed to date. In other words, it is important for the school and university to recognise the impact that has been achieved through the DfB Initiative and support future developments.
- Embedding more entrepreneurial content in the ILOs across Levels 1 & 2 at DJCAD in order to build the scaffolding for later years.
- Ensuring that entrepreneurial content is delivered on a much wider scale beyond dedicated stand-alone modules and programmes, thereby creating a more meaningful impact across the school.
- Increasing DJCAD staff’s understanding of the value and relevance of entrepreneurship education within a design context by continuously promoting awareness and improving levels of engagement with the CfE.

Although more work is clearly needed, particularly around educating all staff on the importance of entrepreneurial mindsets and behaviours, the value of the initiative is supported by school management who encourage staff buy-in, ensure operational resources are in place and continually develop strategies in order to provide a better foundation for further implementation.

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